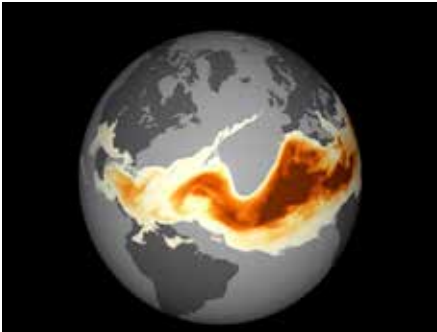# Powered by
Global Systems Laboratory
FORECAST SYSTEMS THAT DELIVER SOLUTIONS

Advanced Technologies

- Machine learning
- Artificial intelligence
- High-performance computing research
- Advanced visualization

GSL's high-performance computing research and cutting-edge visualization systems advance numerical weather prediction and support science literacy.

Decision Support Tools

- Hazardous weather
- Emergency management
- Transportation routing
- Fire weather safety
- Public health

GSL develops tools that streamline the weather decision-making process for NOAA's National Weather Service, Federal Aviation Administration, and the public.
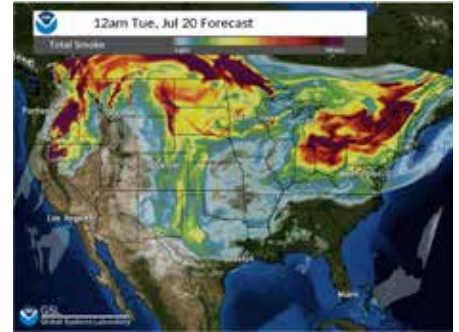
Earth System Prediction

- Physics and chemistry
- Data assimilation
- Coupled models
- Boundary layer
- Clean energy

GSL is a world leader in the development of storm-scale to global-scale environmental prediction models and advanced data assimilation systems.
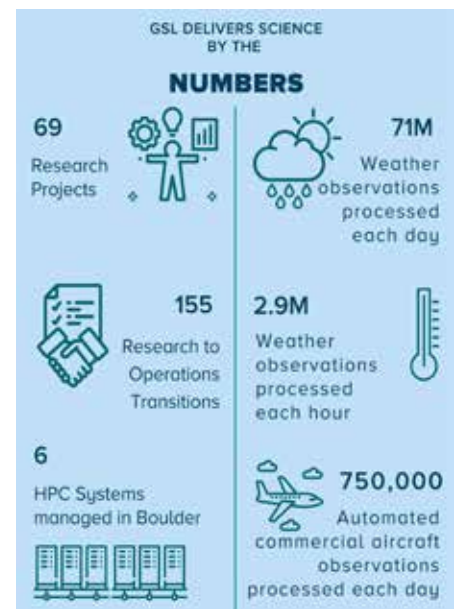
Information Technology Services

- 24x7x365 system monitoring
- Six high-performance computing systems
- Cutting-edge cloud infrastructure
- Ingest and disseminate global operational and research data

GSL is one of NOAA's four locations that host research and development high-performance computing systems shared by the entire NOAA community. This system supports hurricane forecast research and new models.

Organizational Excellence

- Efficient administration
- Empowered workforce
- Diverse and inclusive
- Strategic investments
- Evidence based and science driven
- Collaborative research across the laboratory

GSL strives to advance its workforce scientifically, technically, and professionally. GSL is committed to increased diversity and inclusion as well as a strong foundation for succession planning and career growth.

GSL DELIVERS SCIENCE BY THE
NUMBERS

69 Research Projects

71M Weather observations processed each day

155 Research to Operations Transitions

2.9M Weather observations processed each hour

6 HPC Systems managed in Boulder

750,000 Automated commercial aircraft observations processed each day

Public Safety
Each year the American public collectively receives $31B in benefits from weather forecasts.

GSL's data delivery and decision support systems are the cornerstone of operations in all 122 NOAA National Weather Service forecast offices. These systems are used to streamline the hazardous weather warning process.

Transportation
69% of flight delays are caused by weather, costing passengers and the aviation industry about $30B each year.

GSL developed the flagship Rapid Refresh (RAP) and High-Resolution Rapid Refresh (HRRR) models used daily by the FAA and the aviation industry to safely route aircraft around hazardous weather in the air and at terminals.

Clean Energy
Improved weather forecasts allow accurate estimates of the amounts of solar and wind electricity likely to be available at specific times.

GSL's weather models help the energy industry plan for the variable nature of wind and solar energy and can help target the most beneficial locations for clean energy development.

Hazardous Weather
Extreme heat, floods, tornadoes, and other types of hazardous weather kill hundreds of people in the U.S. each year and cause billions of dollars in damage.

GSL develops environmental models and numerical weather prediction techniques to make forecasts more reliable and skillful. GSL also evaluates these models to pinpoint where   they need to be improved.

Fire Weather and Smoke
Atmospheric aerosols in wildfire smoke and air pollution kill an estimated 4.2 million people each year worldwide.

NOAA and other agencies use both the GSL-developed HRRR Smoke and the GSL-led Global Ensemble Forecast System - Aerosols (GEFS-Aerosols to make pollution and visibility forecasts for the U.S. and the globe.

Computing
High-performance computing systems drive scientific discoveries and technical innovations.

GSL develops high-performance computing methods to increase computing power at minimum cost. This work supports development of advanced and high-resolution weather models.